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# Crane Camera

## User Manual and Datasheet

### Wired Version



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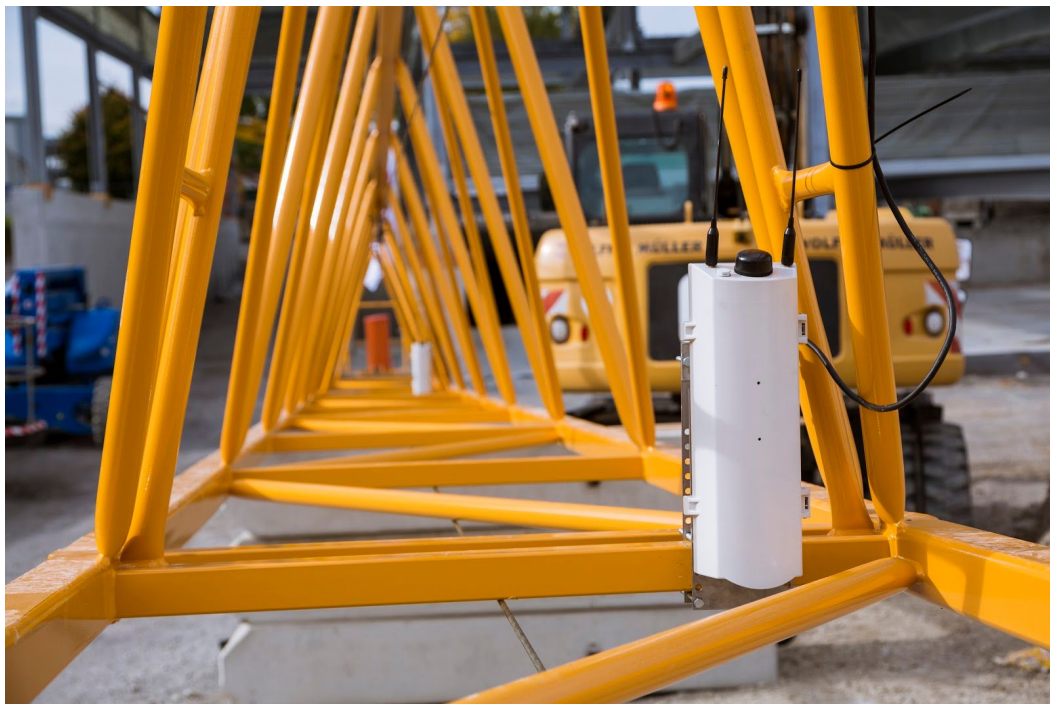
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# Introduction

The Crane Camera solution is a unique combination of hardware, firmware, and photogrammetry software that automatizes construction site surveys on a daily basis to produce geo-referenced and scaled models. Equipped with GPS/IMU sensors, the system is configured to automatically collect site images every day at the same time.

The Crane Camera is mounted on the crane jib for the entire duration of the project and powered by the crane. It functions during normal crane operations and the crane operator does not have to do anything other than their regular work. The Crane Camera system is weatherproof and designed to withstand crane vibrations so the movement does not affect the system accuracy or the quality of the images captured.

The daily generated 2D maps and 3D models are available on the Pix4Dcloud Advanced platform where they can be measured, analyzed, compared with CAD drawings, and shared with all project members, improving collaboration and communication. Outputs can also be exported to third party BIM software for further analysis, such as clash detection and design verification.



# Crane Camera system description

## Crane Camera components

Every Crane Camera unit consists of the following elements:

| Group             | Item  | Quantity       | Comments                               | Provider |
|-------------------|---|----------------|--|----------|
| Crane Camera      | Camera body                                     | 1              |  | Pix4D    |
|                   |   |                |  |          |
| Bracket           | Flat plate                                      | 1              |  | Pix4D    |
|                   | Bent plate                                      | 1              |  | Pix4D    |
| Mounting elements | Regular M8 nut                                  | 18             | Steel 8                                | Pix4D    |
|                   | Screw M8x120                                    | 2              | Steel 8.8                              | Pix4D    |
|                   | Screw M8x70                                     | 4              | Steel 8.8                              | Pix4D    |
|                   | Flat-headed Screw M5                            | 5              | Steel 8.8                              | Pix4D    |
|                   | Cone-headed Screw M5                            | 1              | Steel 8.8                              | Pix4D    |
|                   | Torx key X25                                    | 1              |  | Pix4D    |
|                   | Hex Key   | 1              |  | Pix4D    |
| Connectivity      | Network switch<br>(Netgear GS108GE) or similar  | 1 per<br>Crane |  | Pix4D    |
|                   | 4G Router<br>(TP-LINK TL-MR 6400) or<br>similar | 1 per<br>Crane | When a 4G<br>connection is<br>required | Pix4D    |
| Power             | Extension power cable                           | As<br>required |  | Customer |
|                   | Waterproof junction boxes                       | As<br>required |  | Customer |

Each unit is shipped in an outdoor protective case that can withstand harsh shipping conditions. All nuts and bolts are provided for each unit.

## Crane Camera system configuration

We define the 'Crane Camera system' as one or more Crane Cameras assigned to a specific construction site, that works in coordination and contributes their datasets to a common Site in the Pix4Dcloud Advanced.

The configuration of the Crane Camera system relies on the number and position of T-type tower cranes on a construction site. The Crane Camera system can only be installed on T-type tower cranes.

A construction site may have more than one tower crane. This depends on the engineering plans and the contracting company.

Multiple Crane Cameras can be installed on each crane in order to fully cover the site. The exact number of cameras and their positions along the jib are calculated on a case-by-case basis by Pix4D through a Coverage Analysis process. This preliminary study helps ensure the area of interest will be fully covered by the Crane Camera system.

Multiple parameters are taken into consideration during Pix4D's Coverage Analysis, including the size of the site, the model, height and position of the crane, and the height of the building that is to be monitored. The footprint of the pictures captured by the camera depends on the distance from the lens to the target. The target is typically the top of the building under construction, and the distance from crane to target changes as the building grows.

The Coverage Analysis maximizes the footprint overlap during the whole duration of the project, to guarantee the best possible processing results.



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## Crane Camera system functioning

A Crane Camera system is typically composed of multiple Crane Cameras that work together, contributing the pictures they capture to a common project.

Each Crane Camera is position-aware: it knows its exact geographic position thanks to several embedded movement sensors (GPS receiver, IMU), which sense the circular motion of the crane and its orientation. The system also keeps track of the areas below the crane. If a region has already been covered, the Crane Camera remains ready and on hold, but does not capture further photos until it enters an "unexplored" area.

A Crane Camera system cycles multiple times between *active* and *idle* periods every week. The active periods are called *Collections*, during which the system remains engaged, tracking its position and ready to collect images: therefore, collections should match the working hours of the construction site, when the crane is moving. Each Collection is defined by its *start* and *stop* times, which are agreed with the customer and configured by the technical team at Pix4D. Up to two collection periods per day can be set - for example, in the morning and in the afternoon, but not before sunrise or after sunset, due to low light.

When the full site has been captured by the system, or when the collection window ends (whichever happens first), the images are automatically uploaded to the Pix4Dcloud Advanced and processing is triggered. If the crane has not moved enough during the collection period, and the number of captured images is insufficient to obtain a good 2D/3D reconstruction, the dataset will be automatically discarded. In all other cases, when the processing is complete the user is notified by email, and the results become available in the Pix4Dcloud Advanced timeline.



# Crane Camera system installation

The full Crane Camera system installation process consists of four stages:

1. Preparatory tasks, prior to the physical installation
2. System validation on-site
3. Installing the bracket in the Crane Camera (on the ground)
4. Install the Crane Camera on the crane's beam

These steps are explained in the following sections of this manual.

## Preparatory tasks

Prior to the installation of a Crane Camera system, please read and agree on the following points, and provide the requested pieces of information:

### Coverage Analysis and user account

For Pix4D to define the Crane Camera system configuration and pricing, the customer needs to provide:

- CAD plans including a top view of the site, and the location of the cranes.
- The area of interest that should be covered by the cameras.
- A side view, containing the elevations of the buildings and cranes.
- The crane model and configuration (tower elevation, jib length).

The customer will need a Pix4Dcloud User Account. To sign up for a new account, visit <https://account.pix4d.com/signup> and sign-up for a free trial account (please, read the [Terms and Conditions](#)!)



## Connectivity

The Crane Camera system requires an active internet connection via an ethernet cable to connect to the Pix4D servers.

Pix4D will provide the following:

- **Ethernet extension cable for each Crane Camera**

The length of the ethernet extension cable is defined during the Crane Camera Coverage Analysis and can be from 20m to 75m, depending on the camera location on the jib.

- **Weatherproof ethernet connectors**

One connector is shipped per camera. The connector is pre-installed by Pix4D.

- **Networking switch**

Depending on the number of cameras, Pix4D will provide a networking switch with sufficient ports.

- **4G Router**

Optional, in case of absence of a landline network.

The end-user will provide the following:

- **Access to a landline network**

An active internet connection through one ethernet port at the top of the crane

- **Firewall clearance for the ports:**

- SSH/SFTP: 22
- HTTP: 80

- **In case of absence of a landline network**


- A 4G SIM card with an active data plan
- A data plan of preferably unlimited data or a minimum of 17 GB per camera
- E.g., A crane with four cameras requires a minimum of  $17\text{GB} \times 4 = 68\text{GB}$

## Power

The cameras work within the range of **110 to 230 VAC**. They need to be connected to the crane power supply, typically accessible through a switch panel in the cabin.

The Crane Cameras must be connected in parallel. The customer must:

- Choose a power source that is:
  - Always ON, in normal conditions
  - Easy to switch OFF if a reset is required
- Provide enough extension power cable to cover the distance between each camera on the jib and the power source in the crane cabin.
- Provide weatherproof junction boxes to connect the cameras to the extension power cable in the jib.
- Have a crane technician install the extension power cable along the jib, and make all the electrical connections.

 **Warning:** The power switch must be able to provide at least 0.4A AC per Crane Camera.

## Place and timing

To proceed with the shipment, the customer needs to provide the following information:

- Billing address
- Shipping address
- Name and telephone number of the person that is to receive the parcel

Once the cameras are shipped, the transit time is around ten days, although this can vary greatly due to the customs clearance process. If the goods are retained at the border, the courier will typically contact the receiver for any additional document or duty needed (hence the importance of providing a person of contact and telephone). Satisfying any such requirement is the responsibility of the customer.

The installation of each camera by a crane technician typically requires 20-30 minutes, and it requires at least one crane technician. The installation of the extension power cables and the electrical connections is around one hour for three Crane Cameras. During this time, the crane will have to remain blocked, which should be taken into account in the construction site's daily schedule.

A "Responsibility List" which summarizes *who* should take care of *what* can be found [at the end of this document](#).



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## System validation

After the successful delivery of the cameras, the technical team at Pix4D has to be notified so they can validate the Crane Camera system on site. The validation process is **critical** for the system, and it needs to be done before the installation. If this validation is skipped, Pix4D cannot guarantee the proper functioning of the Crane Camera system.

During the validation process, the system's remote connectivity is checked. The validation process is necessary due to the particularities of mobile internet networks and providers across the globe.

## Standard procedure

Internet connection through a 4G router:

1. Follow the instructions in section: “**3.1. Connecting the extension ethernet cables to the network switch and the network switch to a 4G router.**”
2. Follow the instructions in section: “**3.3 Powering up the network switch and the 4G router.**”
3. Contact Crane Team of Pix4D at [construction.support@pix4d.com](mailto:construction.support@pix4d.com).

Internet connection through a LAN port:

1. Follow the instructions in section: “**3.2. Connecting the extension ethernet cables to the network switch and the network switch to LAN port.**”
2. Follow the instructions in section: “**3.3 Powering up the network switch and the 4G router.**”
3. Contact Crane Team of Pix4D at [construction.support@pix4d.com](mailto:construction.support@pix4d.com).

**! Important:** regardless of the internet connection type, keep the full system plugged in for one or two days while the technical team performs the validation.

## Installing the Crane Camera system

Crane Cameras are mounted on the jib with a bracketing system provided by Pix4D. The bracketing system is compatible with the most popular types of tower cranes.

The beam where the camera is to be installed needs to have a square section; the beam cannot be tubular. A square or prismatic beam can typically be found at both ends of the modular sections that compose the jib. Pix4D will take this limitation into account (if the crane specification is available) to produce a Coverage Analysis precisely defines the section joint where every Crane Camera has to be mounted.

The process to install a Crane Camera system consists of the following major steps:

1. Assemble the bracket and the Crane Camera (on the ground)
2. Install the camera on the crane (on the jib)
3. Network connections



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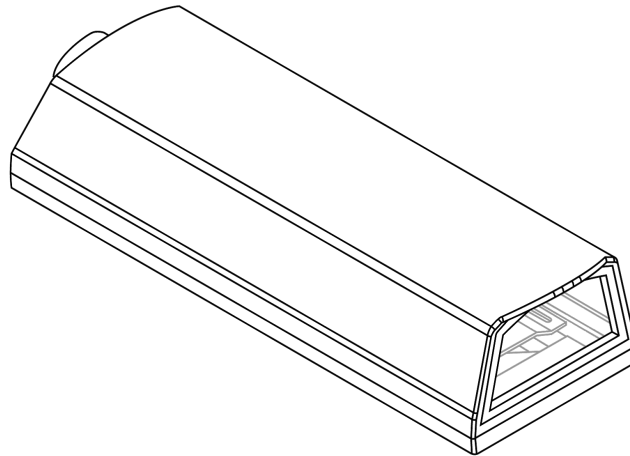
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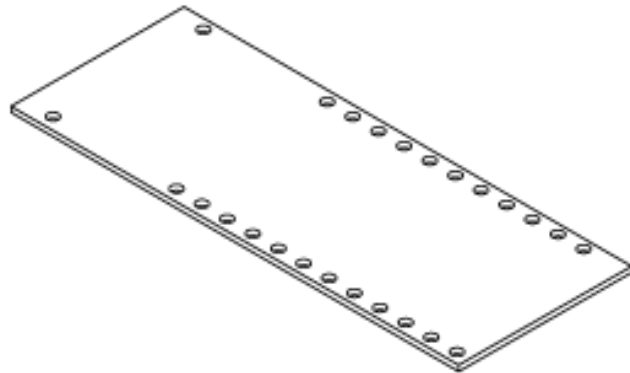
## 1. Installing the bracket on the Crane Camera (on the ground)

Please have ready the following materials:

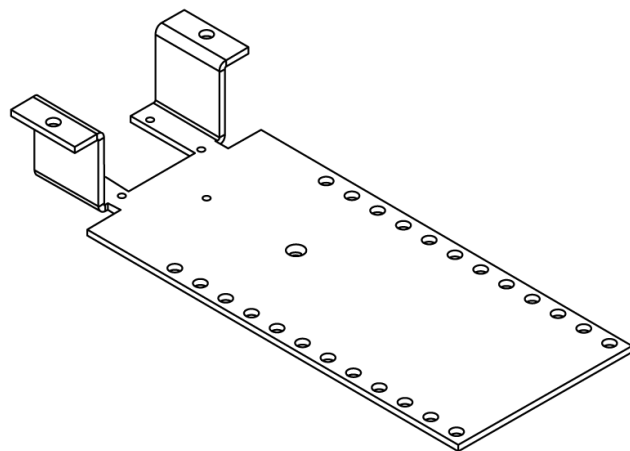
1x  
Crane Camera

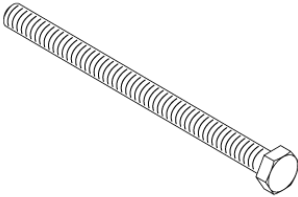
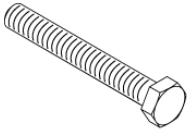
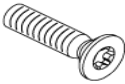

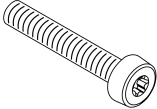
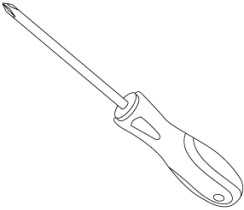


1x  
Flat bracket  
plate



1x  
Bent bracket  
plate



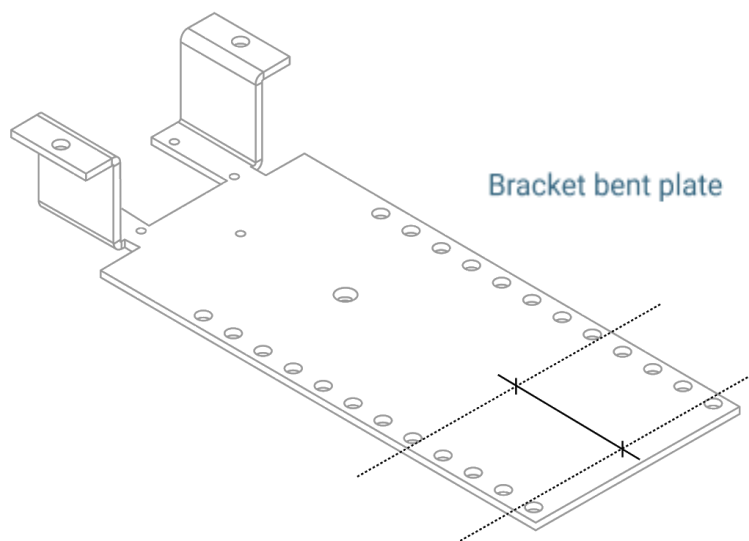
|                                  |   |                               |   |
|----------------------------------|---|-------------------------------|---|
| 2x<br>Screw M8x120               |  | 4x<br>Screw M8x70             |  |
| 1x<br>Cone-headed<br>screw M5x10 |  | 18x<br>Regular M8<br>nut      |  |
| 5x<br>Flat-headed<br>screw M5x10 |  | 1x<br>Torx X25<br>Screwdriver |  |

## 1.1. Prepare the bent plate

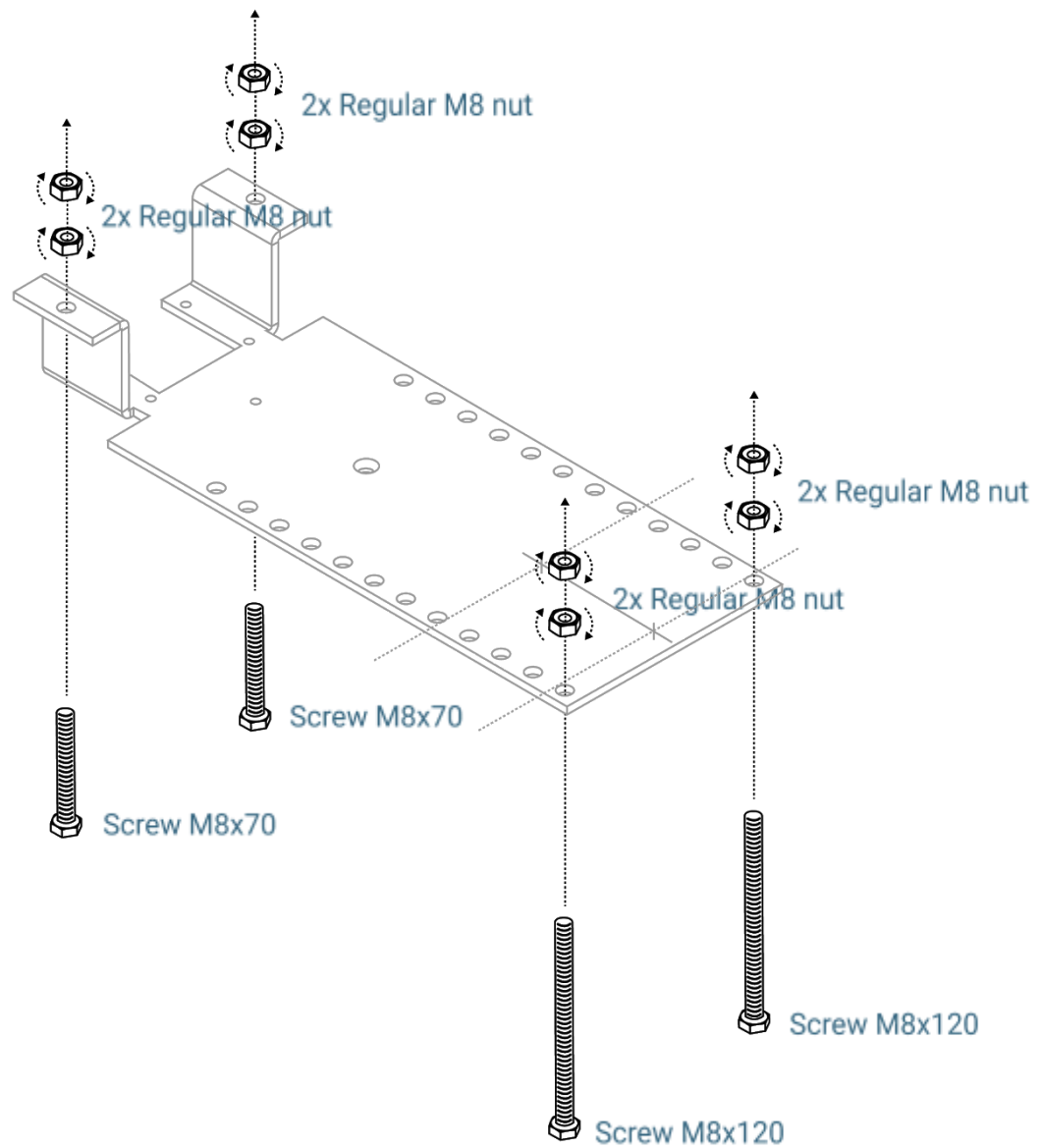
Attach four screws to the bracket bent plate, to facilitate handling in later steps.

Necessary parts:

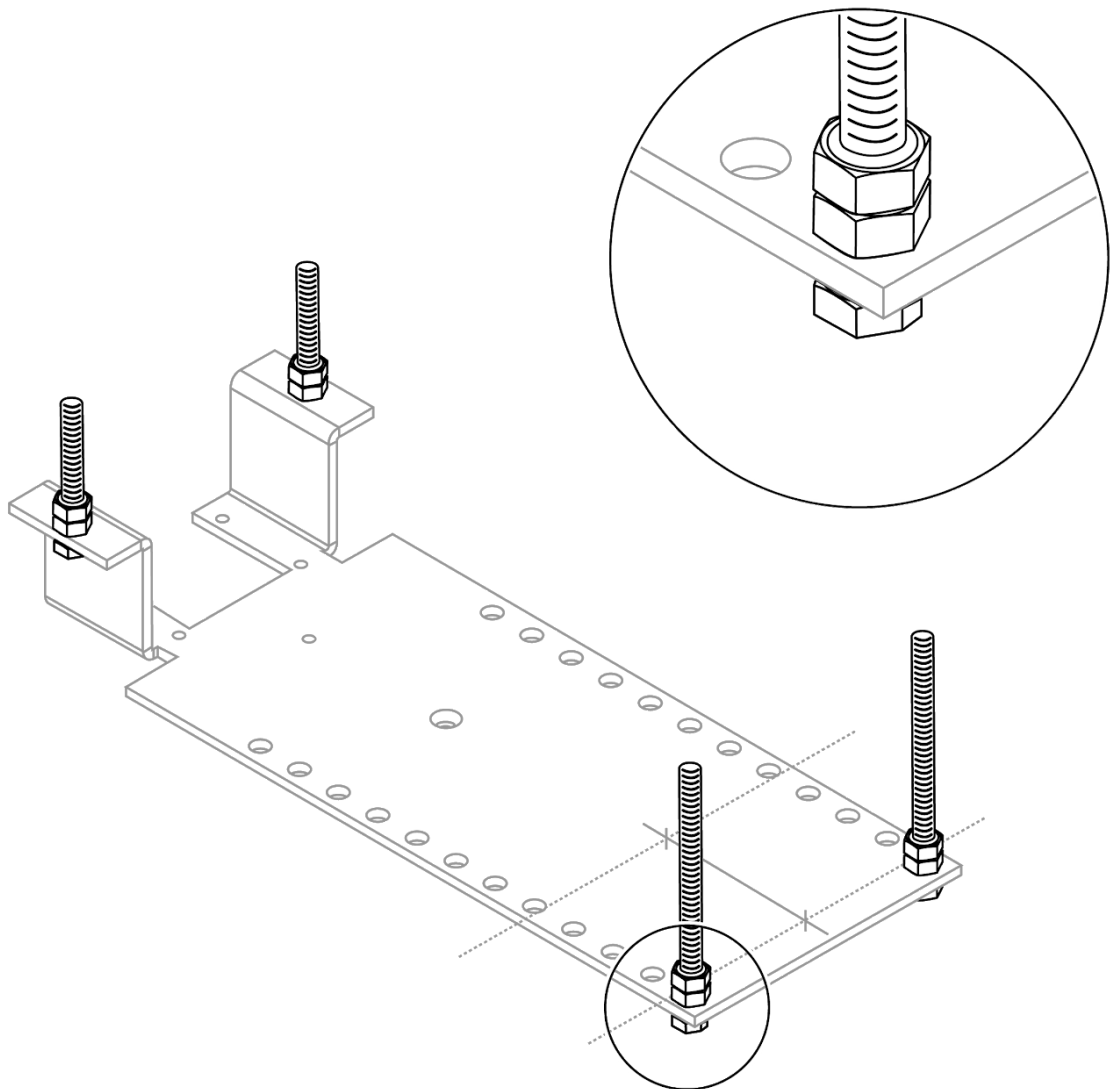
- 2x screw M8x70
- 2x screw M8x120
- 8x M8 nut



## 1.2. Install the bent plate screws and nuts.







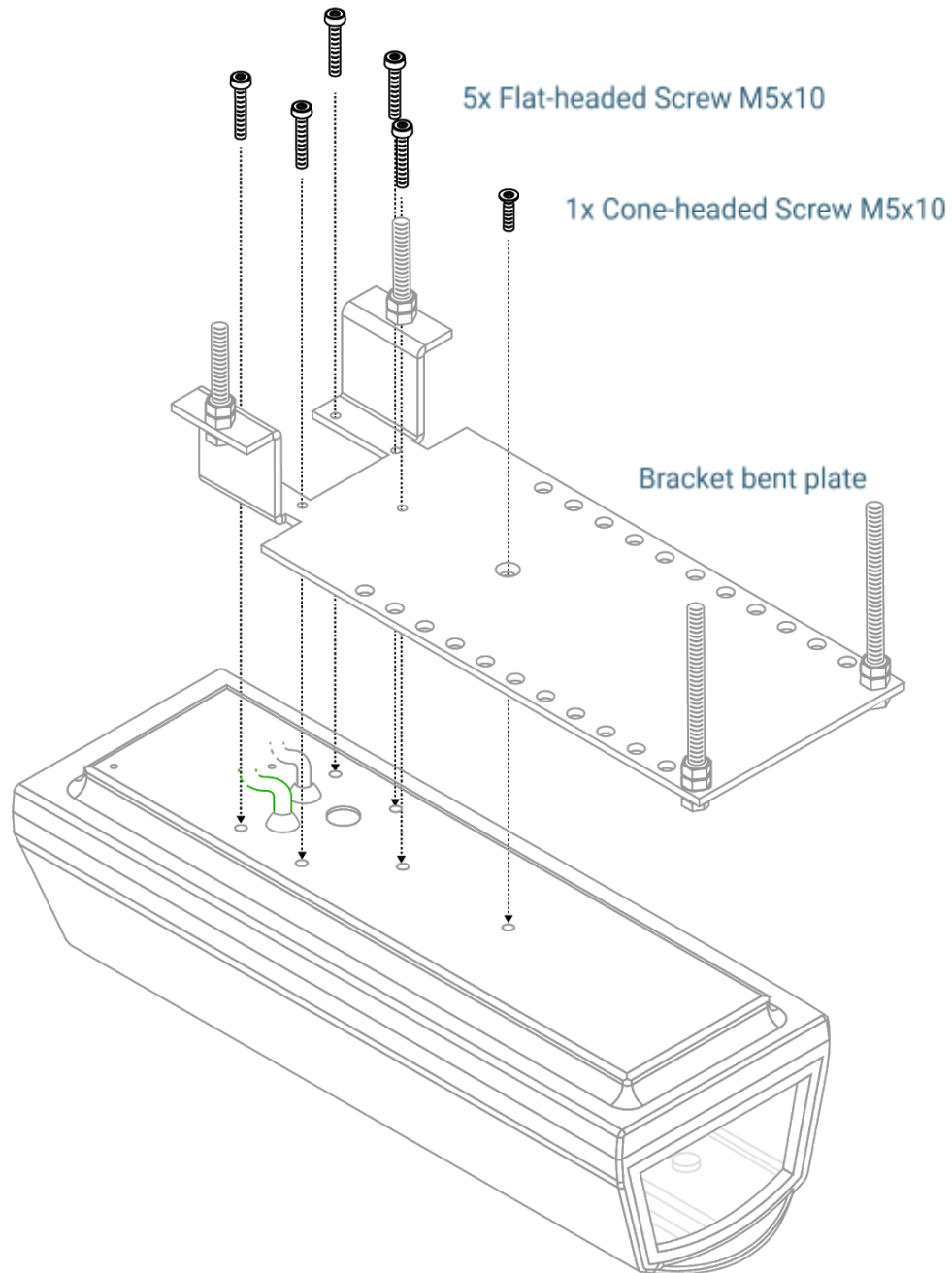
**!** **Important:** Firmly tighten both nuts at the same time.

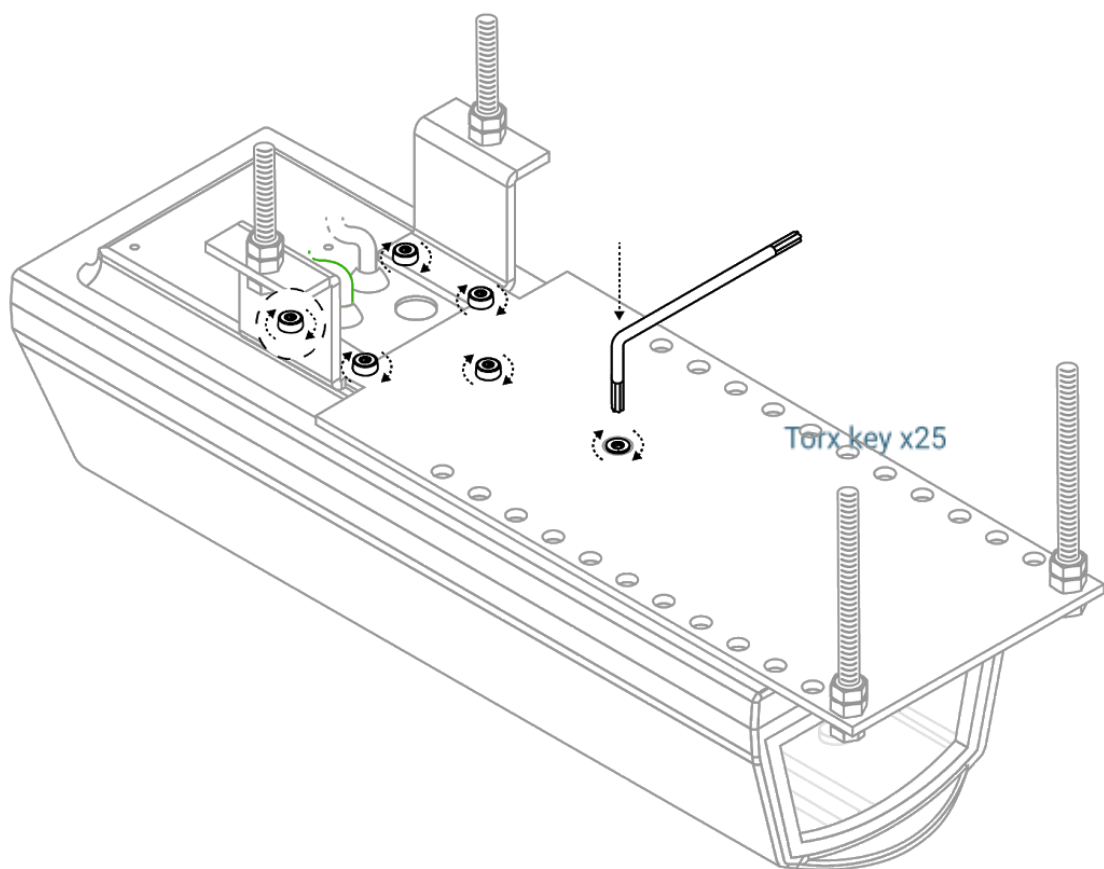
### 1.3. Attach the bent plate to the Crane Camera

Place the bent plate on the bottom of the Crane Camera, with the six holes aligned.

Necessary parts:

- 5x Flat-headed screw M5x10
- 1x Cone-headed screw M5x10





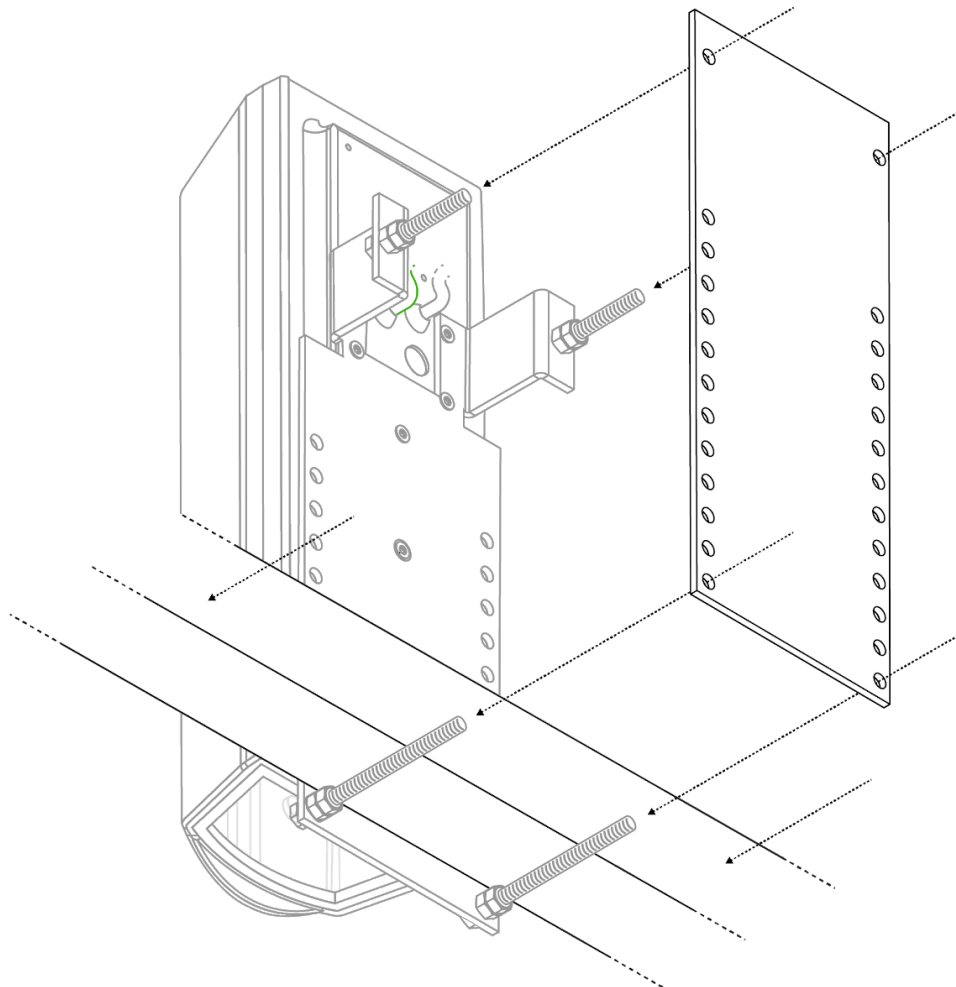
**!** **Important:** Firmly tighten the screws with the Torx key.

## 2. Install the Crane Camera on the jib

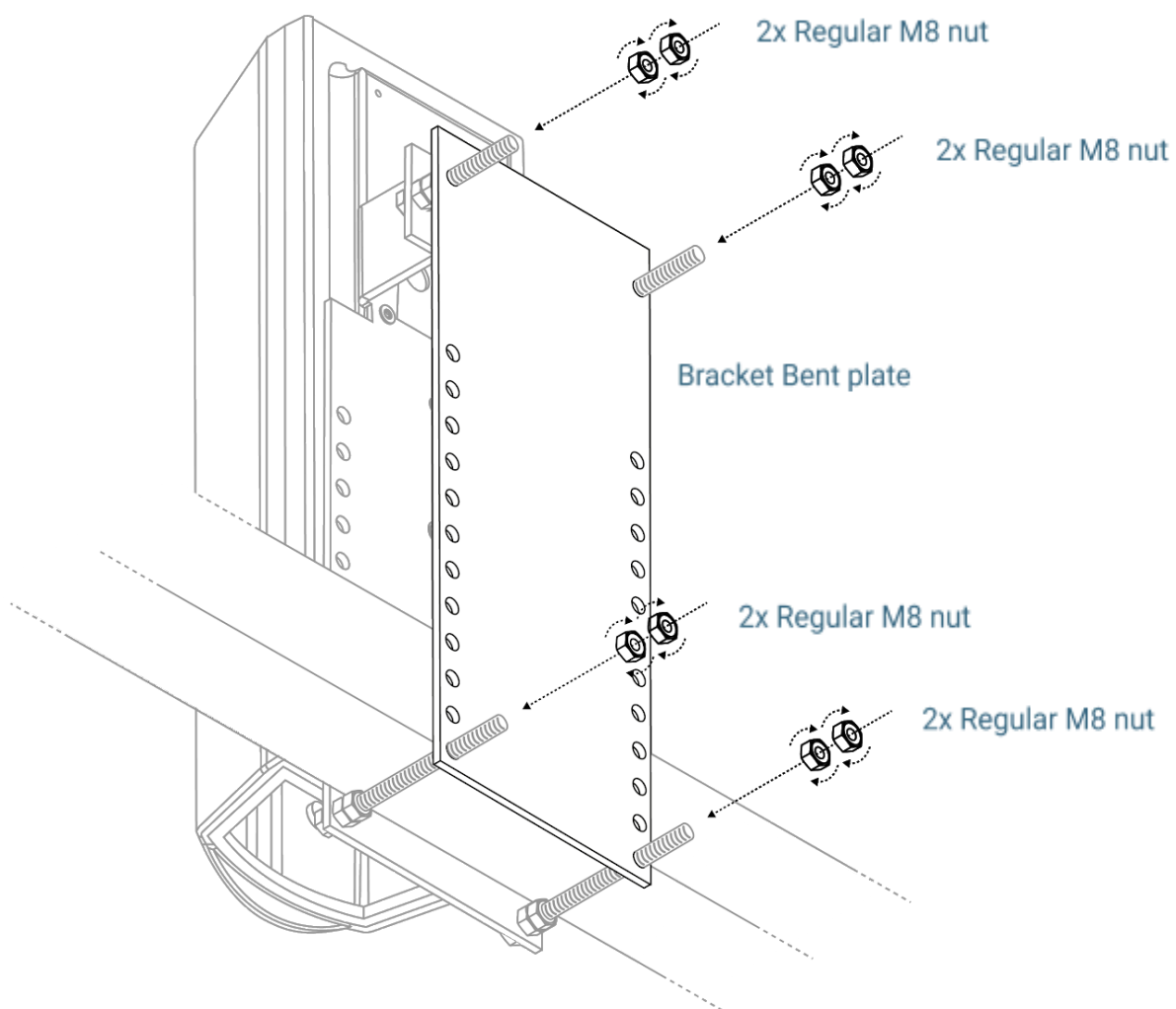
Please have ready the following materials:

- 2x screw M8x70
- 2x screw M8x120
- 8x M8 nut
- Bracket flat plate

### 1. Fit the flat bracket plate.



## 2.2. Secure it with the M8 nuts

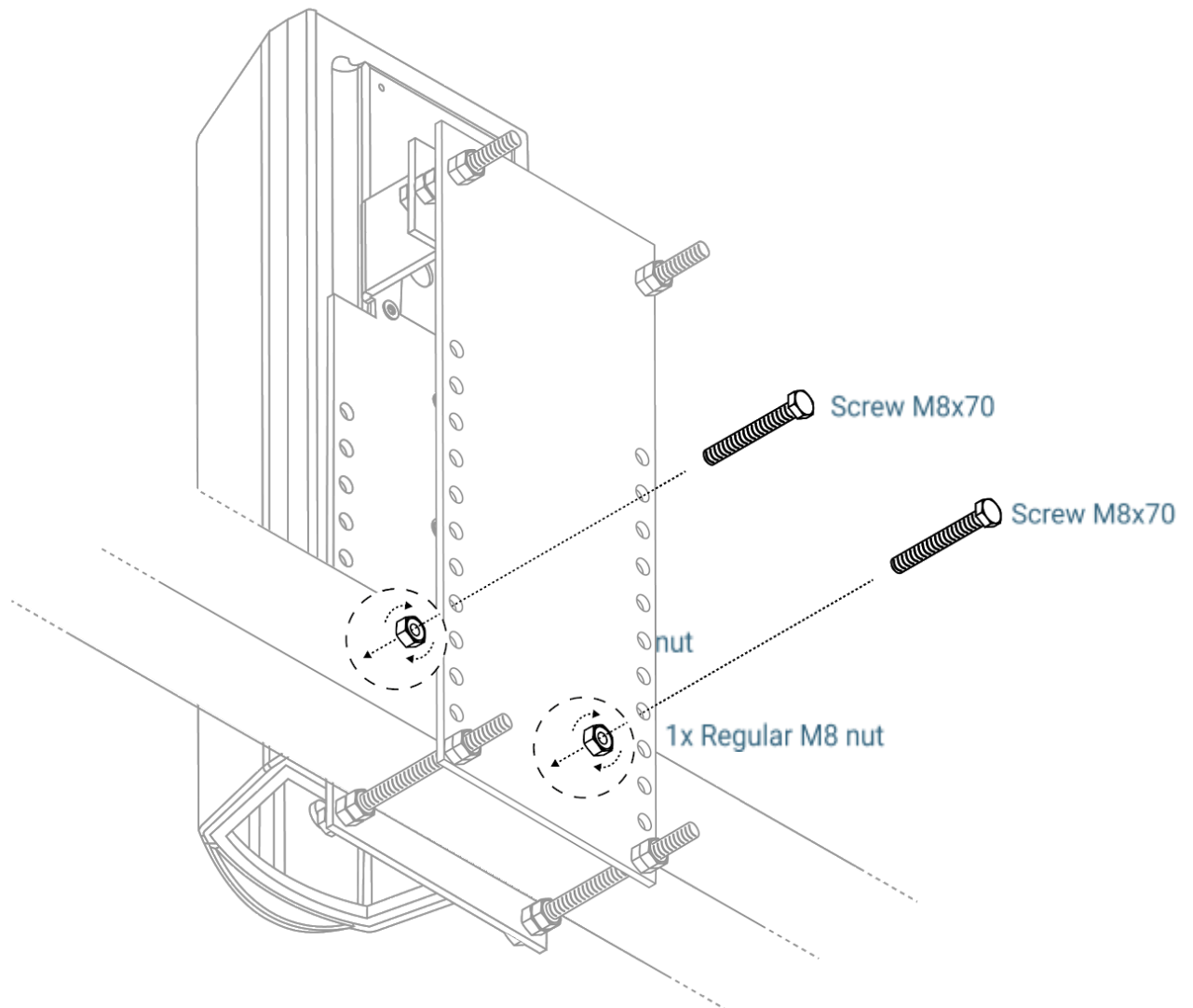


**!** **Important:** Firmly tighten the M8 nuts.

### 2.3. Install the safety M8x70 screws.

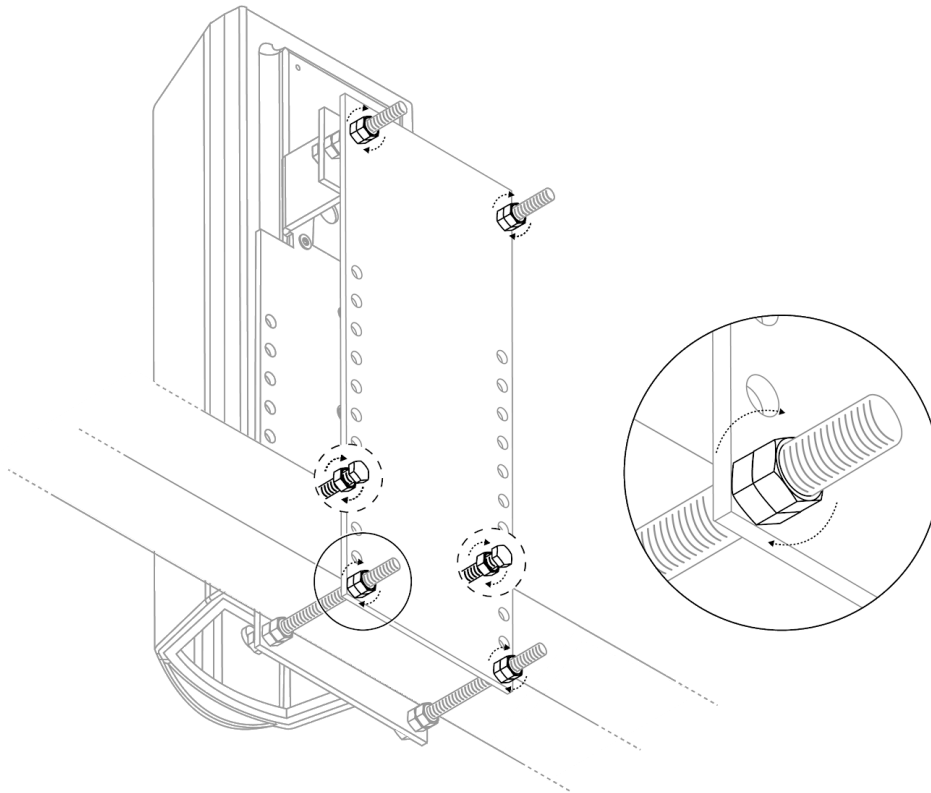
Necessary parts:

- 2x screw M8x70
- 2x M8 nut



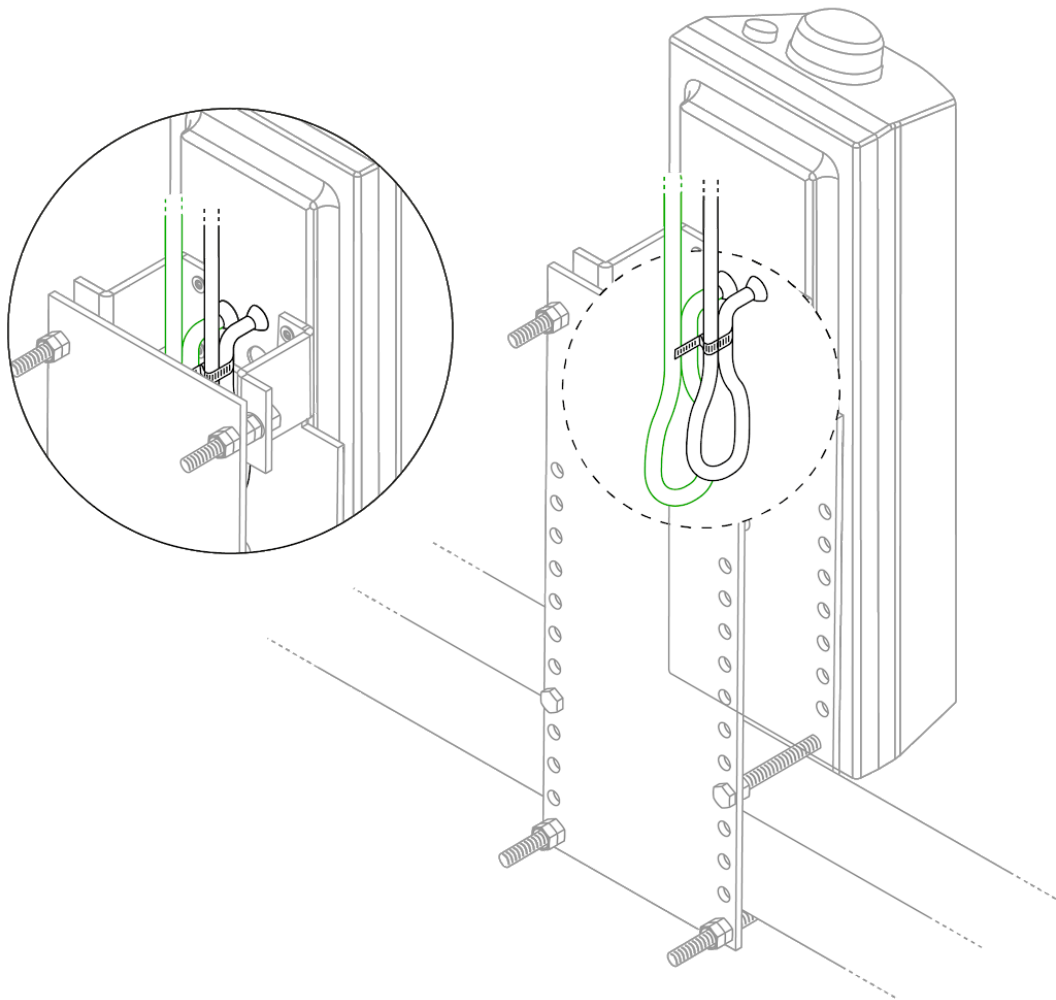
## 2.4. Check and tighten all nuts and bolts.

**!** **Important:** All nuts and bolts should be checked and tightened with an M8 wrench key.



**!** **Warning:** Make sure that the Crane Camera does not interfere with the jib trolley and there is enough clearance for the trolley to pass underneath.

## 2.5. Fold the power cable with a zip-tie.



**!** **Important:** This step ensures that any water droplets are directed away from the cable-case junction. It must not be omitted.

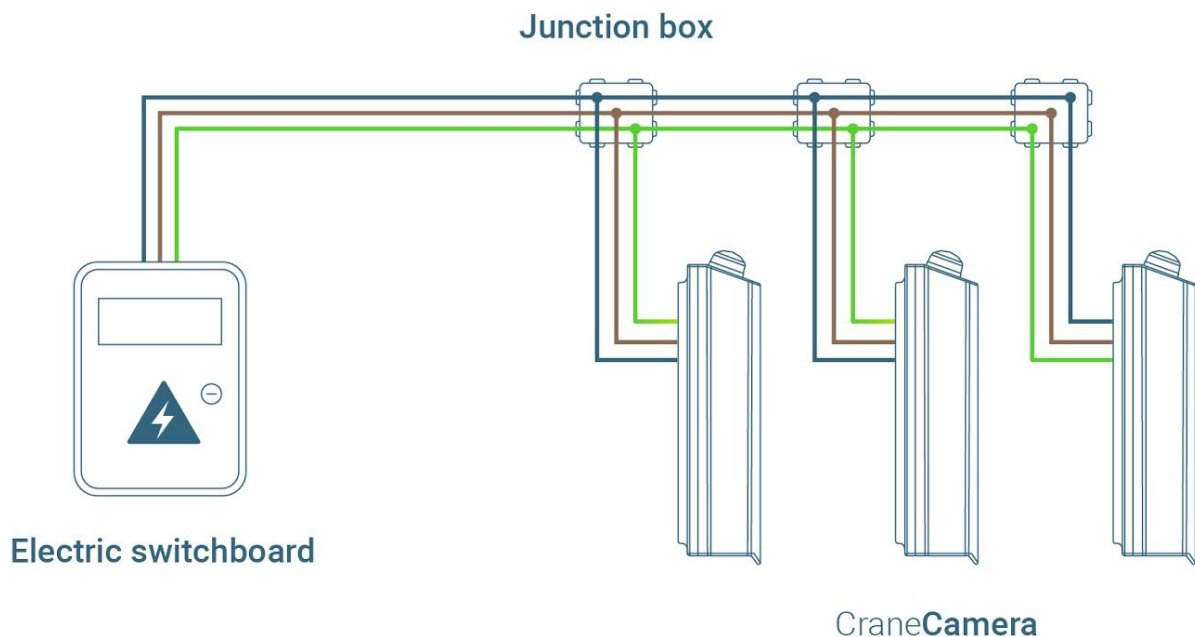


## 2.6. Laying the extension power cable along the jib

An extension power cable must be laid along the crane jib to power the Crane Camera(s). The cable should be weatherproof and long enough to reach all the cameras. The proposed length will be provided in the Crane Camera Coverage Analysis.

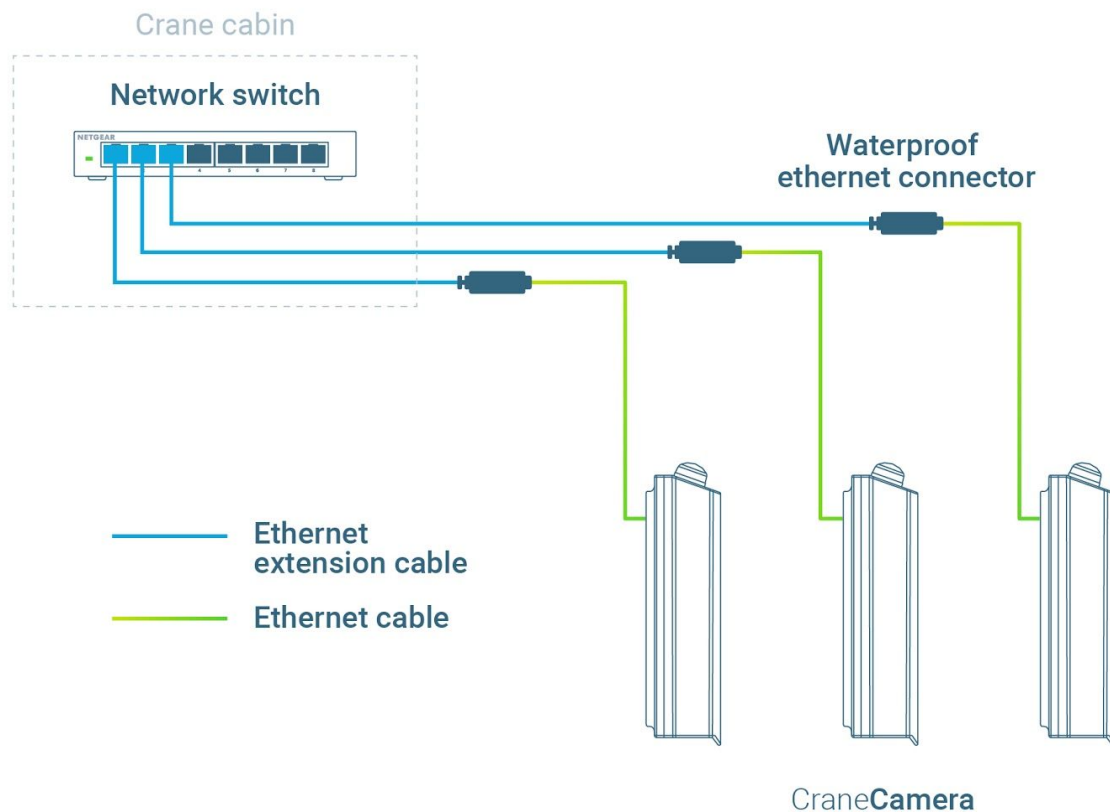
## 2.7. Connecting the Crane Camera to the extension power cable

Each camera has to be connected to the power cable in parallel. All of the connections have to be weatherproofed in a junction box. All the electrical connections must be completed by a crane technician.



## 2.8. Laying the extension ethernet cable along the jib

The ethernet extension cables must be laid along the crane jib to connect the Crane Camera(s) with the network switch. Each cable must be tied securely to the jib. The network switch should be located in the crane cabin or a location protected from the weather elements and with easy access.



## 2.9. Connecting the extension power cable to the power source

The power extension cable has to be connected to a dedicated power switch in the crane's switchboard and not plugged into a wall socket in the cabin. The operation voltage of the Crane Cameras is **110-230 VAC**.

It is essential to prevent the cameras from being unplugged if someone unaware of the installation enters the cabin. However, the power has to be switchable (can be turned OFF and ON) because the system may occasionally need to be reset manually.

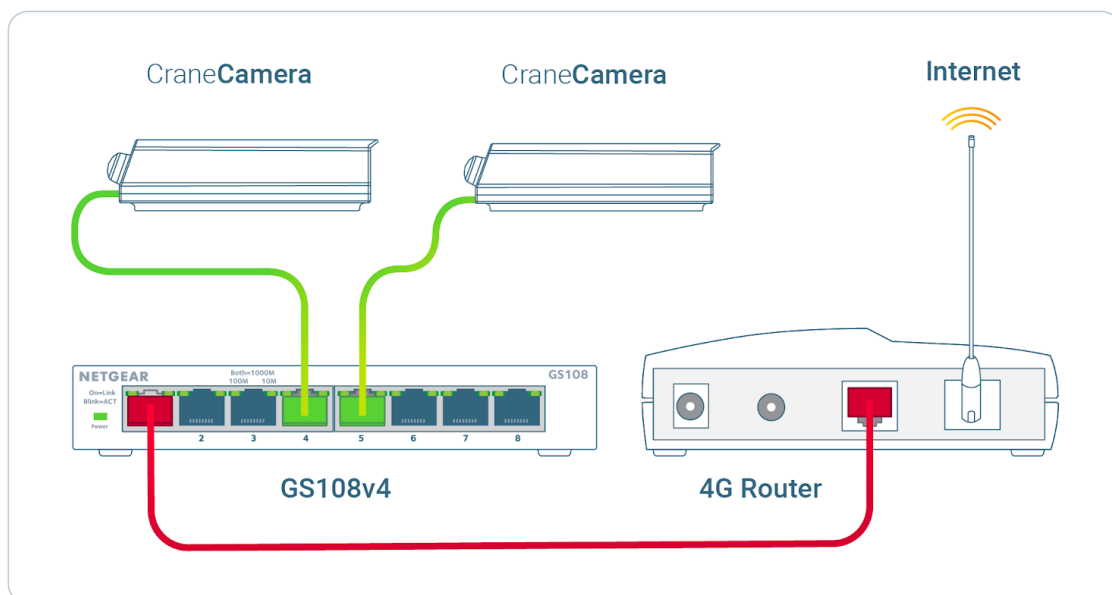
### 3. Network connections

#### 3.1. Connecting the extension ethernet cables to the network switch and the network switch to a 4G router.

The internet connection to the Crane Cameras is provided through the ethernet cables. Each ethernet cable connects one Crane Camera with the network switch. Connect the ethernet cables to the network switch, as indicated by Step 1 image below.

Once all the cameras are connected to the network switch, connect the network switch with the 4G router via a single ethernet cable.

##### Step 1 – Connect the equipment

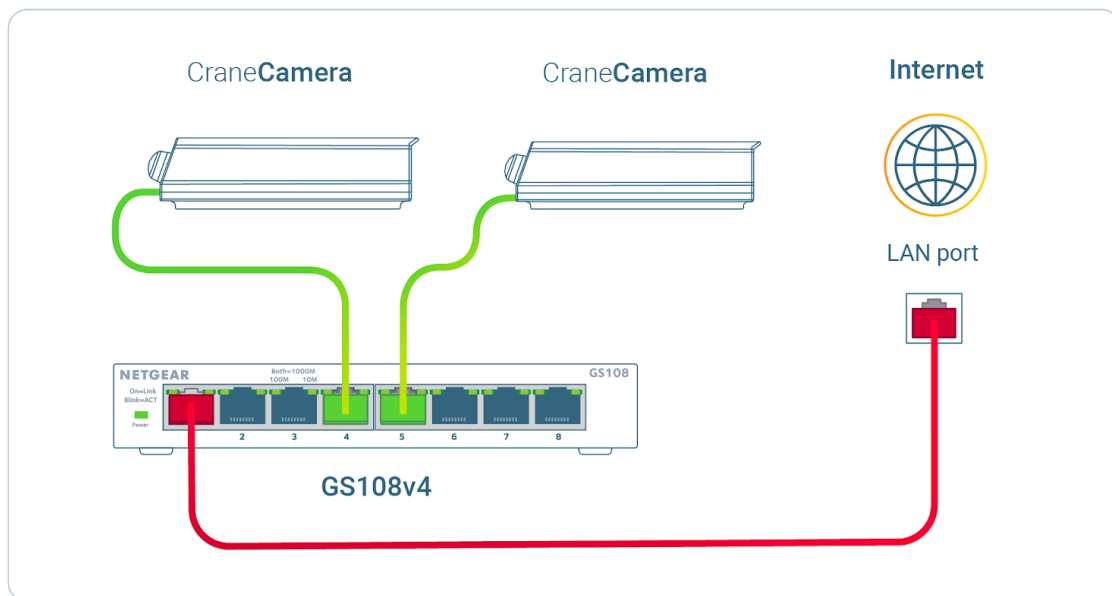


### 3.2. Connecting the extension ethernet cables to the network switch and the network switch to LAN port.

The internet connection to the Crane Cameras is provided through the ethernet cables. Each ethernet cable connects one Crane Camera with the network switch. Connect the ethernet cables to the network switch, as indicated by Step 1 image below.

Once all the cameras are connected to the network switch, connect the network switch with the LAN port via a single ethernet cable.

#### Step 1 – Connect the equipment



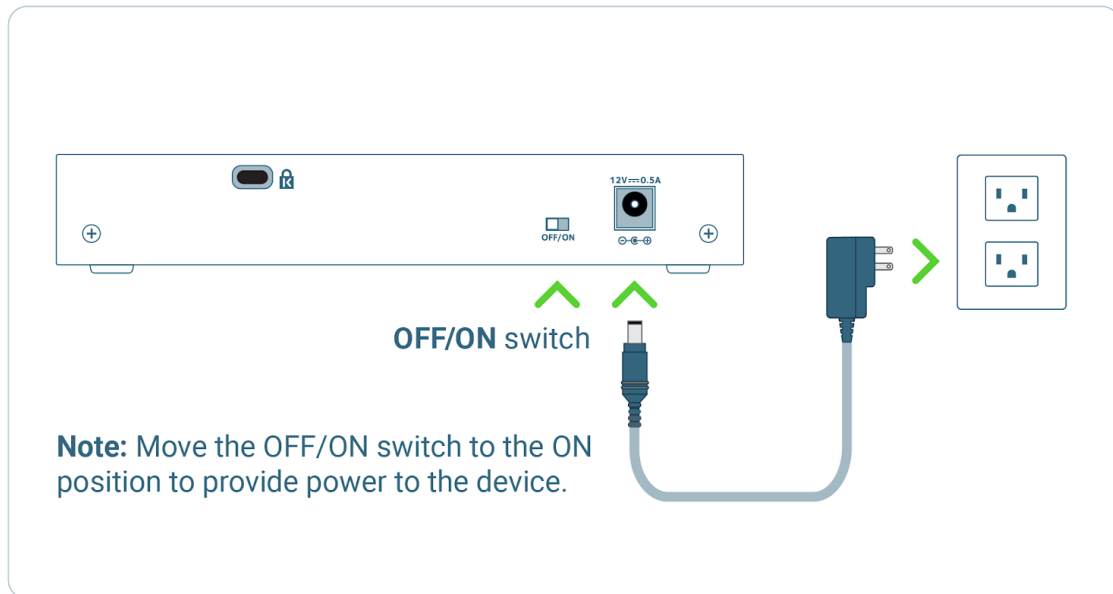
**Warning:** Make sure the LAN port has an active internet connection and Firewall clearance for the ports:

- a. SSH/SFTP : 22
- b. HTTP: 80

### 3.3 Powering up the network switch and the 4G router.

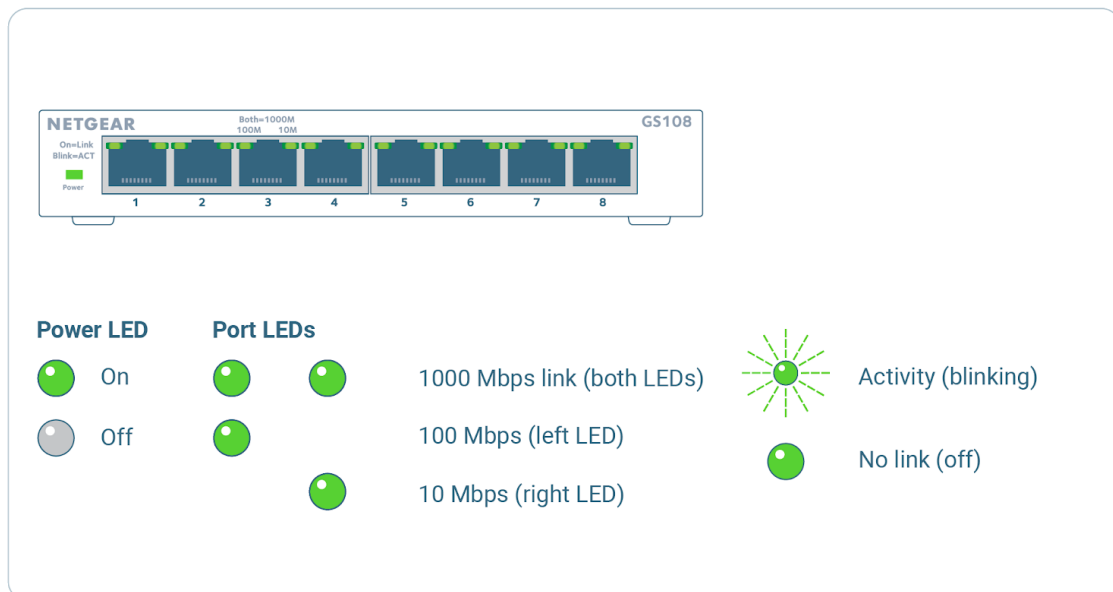
Connect the power adapter to the network switch, as indicated below, and turn it on. Perform the same step if a 4G router is connected to the network switch.

#### Step 2 – Connect to power and power on



After powering on all connected devices, i.e., the Crane Cameras (and the 4G router if present), monitor the status of the switch. In case of no activity, contact the Crane Camera Support Team at [construction.support@pix4d.com](mailto:construction.support@pix4d.com).

#### Step 3 – Check the status



#### 4. Additional considerations

The estimated time of installation per camera on the jib is 20-30 minutes, and it requires at least one crane technician. The installation of the extension power cable and the electrical connections is around one hour for three Crane Cameras.



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# Technical datasheet

This section describes different technical aspects of the Crane Camera. These should be taken into account by the customer when assessing and preparing the installation and operation of a Crane Camera system.

## Global specifications

|                                 |  |
|---------------------------------|--|
| <b>External dimensions</b>      | 412 x 176 x 160 mm approx. (without bracket)                       |
| <b>Weight</b>                   | 8 kg approx. (including bracket and mounting hardware)             |
| <b>Power input</b>              | 110-230 VAC<br>0.4 A max   |
| <b>Temperature range</b>        | -20° C to 60° C  |
| <b>Protection rating</b>        | IP66   |
| <b>Heating (automatic mode)</b> | $T_{on} = 15^{\circ} \text{ C}$ , $T_{off} = 22^{\circ} \text{ C}$ |

## Communications

|                              |  |
|------------------------------|--|
| <b>Internet connectivity</b> | 4G router<br>(TP-LINK TL-MR 6400) or similar   |
|                              | Network switch<br>(Netgear GS108GE) or similar   |
| <b>Positioning</b>           | GPS  |
| <b>GNSS antenna</b>          | Taoglas Hercules MA.501<br>Permanent, low-profile mount<br>1575.42MHz<br>32dB average gain |

## Camera profile image

|                                |                           |
|--------------------------------|---------------------------|
| <b>Camera model</b>            | S.O.D.A. by senseFly      |
| <b>Image sensor resolution</b> | 20 Megapixels (5496x3672) |
| <b>Image sensor size</b>       | 1 inch                    |
| <b>Image sensor type</b>       | BSI CMOS                  |
| <b>Optical zoom</b>            | 1x (fixed focal length)   |



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|                                |                                       |
|--------------------------------|---------------------------------------|
| <b>Aperture</b>                | F2.8 – 11 / Multistage Iris Diaphragm |
| <b>Focal Length (35mm eq.)</b> | 28 mm                                 |
| <b>Shutter Type</b>            | Mechanical global shutter             |

## Housing

The main body of the Crane Camera system contains the image sensor and electronics and protects them from any harsh environmental conditions they may face at the top of the crane.

|   |  |
|---|--|
| <b>Enclosure type</b>                                   | CCTV case  |
| <b>Material</b>   | Aluminum body, with small plastic/rubber/stainless steel attachments (glands, valves, o-rings, connectors, screws)<br>Glass window |
| <b>Pressure compensation and condensation reduction</b> | Screw mounting membrane vent by Gore<br>Airflow: 450 ml/min  |

## Bracket

|                          |   |
|--------------------------|---|
| <b>Plates material</b>   | Stainless steel<br>4mm thickness<br>2B finish |
| <b>Mounting elements</b> | Galvanized steel nuts and bolts               |

## Troubleshooting and Contact details

In case of any problem with the Crane Camera system please contact the dedicated Crane Camera support team at :

**e-mail:** [construction.support@pix4d.com](mailto:construction.support@pix4d.com)

**phone number:** +41 21 552 0597



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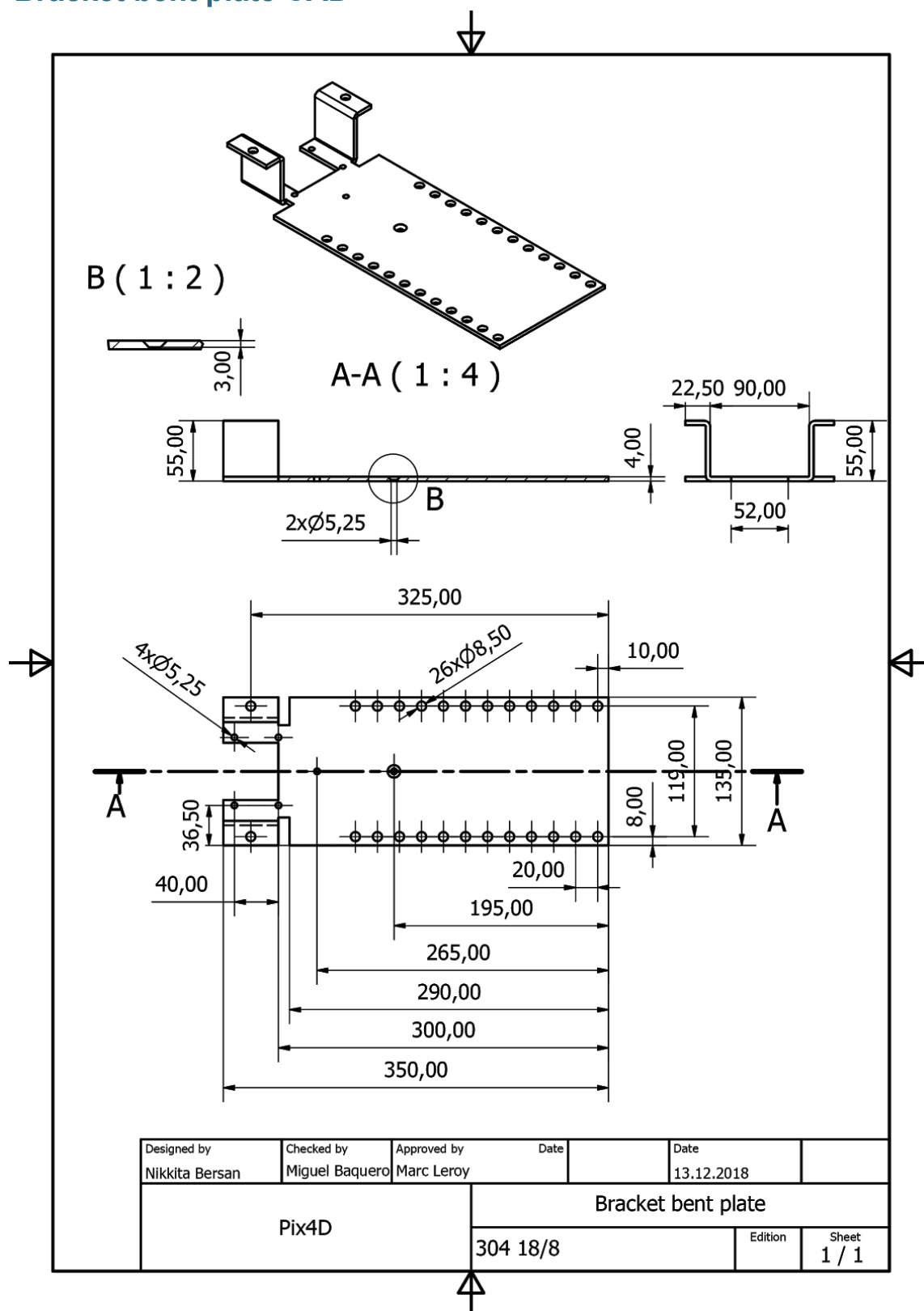


# Appendix

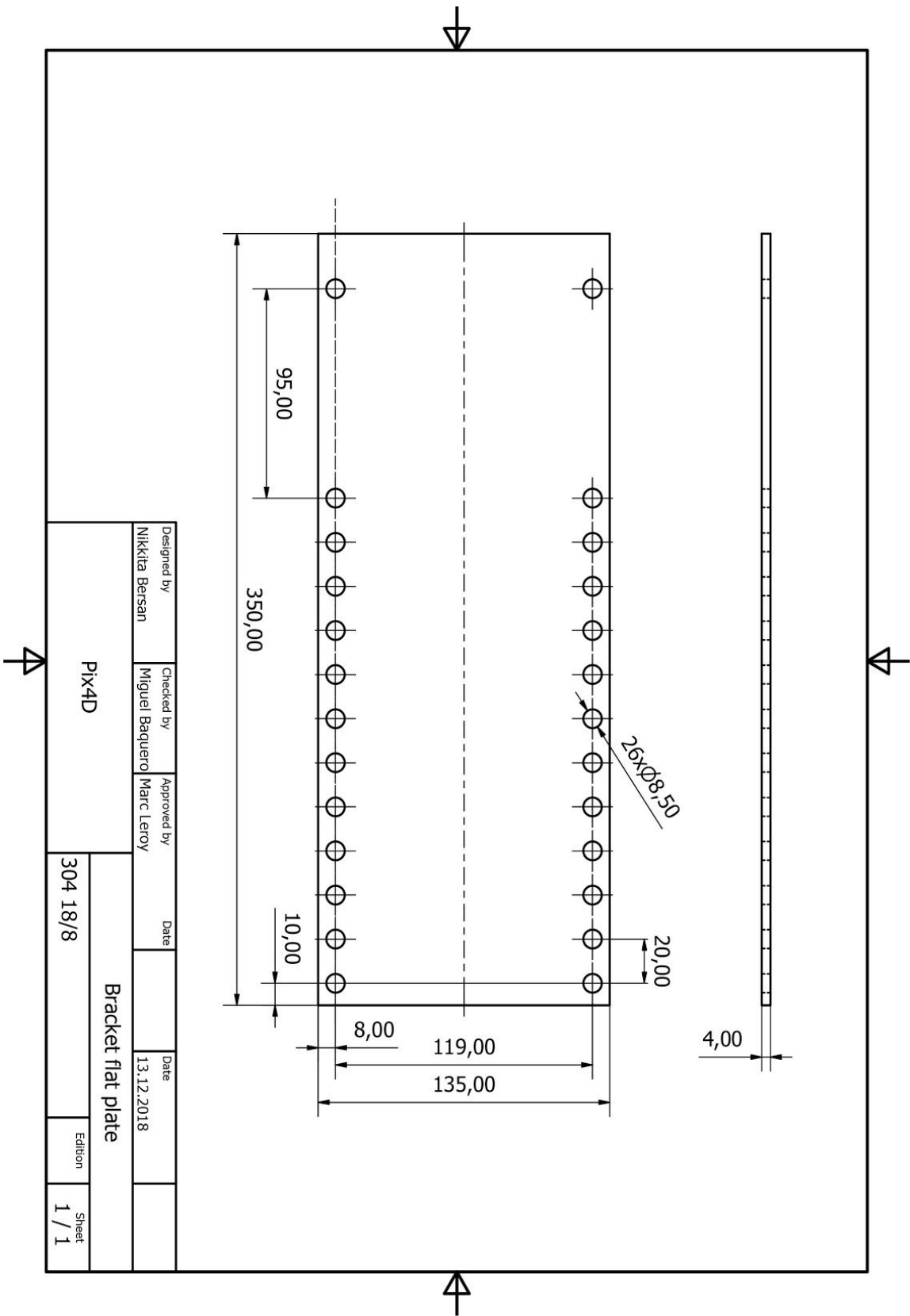
## Responsibility list

| Item                  | Quantity    | Parts  | Comments  | Provider |
|-----------------------|-------------|--|---|----------|
| Crane Camera system   | *           | <ul style="list-style-type: none"> <li>Crane Camera body</li> <li>Bracket bent plate</li> <li>Bracket's flat plate</li> <li>(2x) screw M8x120</li> <li>(4x) screw M8x70</li> <li>(1x) cone-headed screw M5x10</li> <li>(5x) flat-headed screw M5x10</li> <li>(18x) regular nut M8</li> <li>Torx key X25</li> </ul> |   | Pix4D    |
| <b>Connectivity</b>   | 1 per crane | Network switch (Netgear GS108GE) or similar  |   | Pix4D    |
|                       | 1 per crane | 4G router (TP-LINK TL-MR 6400) or similar  | When a 4G connection is required  | Pix4D    |
| Extension power cable |             | —  | Power cable for outdoor use   | Customer |
| Power                 |             | —  | 110-230 VAC   | Customer |
| Crane Technician      | 1-2         | —  |   | Customer |
| Shipping              | —           | —  | Let us know:<br>1. Billing address<br>2. Shipping address<br>3. Name and telephone number of the person that is to receive the parcel |          |

## Bracket bent plate CAD

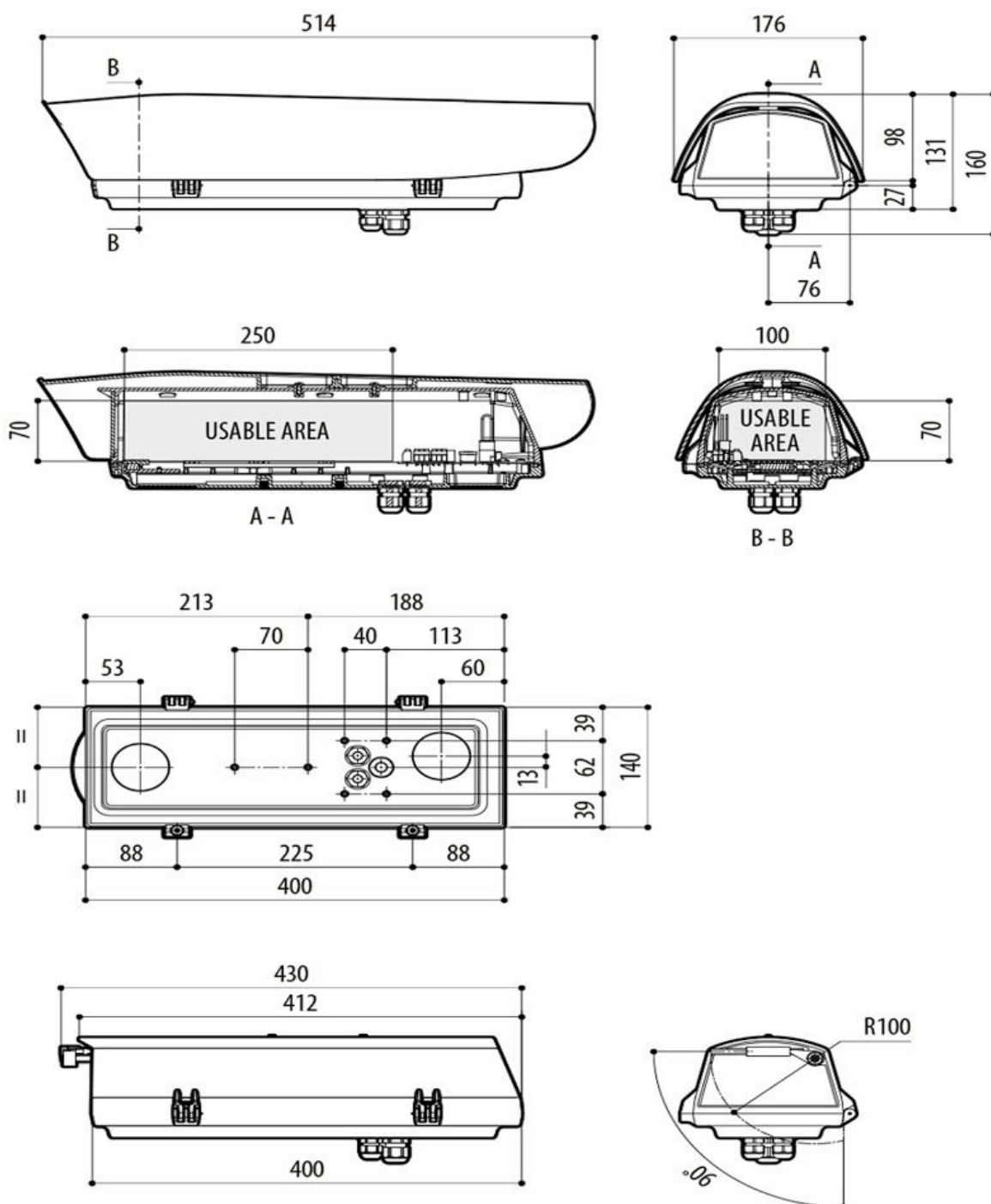


Bracket flat plate CAD



## Camera housing

The indicated measurements are expressed in millimeters.



# Pix4D General Terms of Rental for Crane Camera Systems

## 1. General

1.1 Scope. These general terms and conditions (the "Conditions") govern the rental, delivery and return of Pix4D crane cameras and related accessories (the "System") by Pix4D SA, a Swiss corporation having its registered seat at EPFL Innovation Park, Building F, 1015 Lausanne, Switzerland ("Pix4D") to a customer (the "Customer", Pix4D and the Customer collectively, the "Parties").

1.2 Acceptance of Conditions. By renting the System, Customer agrees to the applicability of the Conditions in respect of all transactions relating to the System's rental. Without prejudice to the Conditions, Pix4D draws the attention of Customer on the existence of other applicable contractual terms, such as the end-user license agreement (<http://pix4d.com/eula/>), which sets the terms for the use of the Pix4D software.

1.3 Personal Use and No Sub-rental. Any rental agreed under these Conditions is strictly personal. Customer shall not sublease the System or any part thereof to a third party. Further, the System shall not be used or operated by anyone other than the Customer or an employee thereof.

## 2. Rental

2.1 Quotations. Unless stated otherwise by Pix4D, quotations merely constitute an invitation to Customer to place an order and are not binding on Pix4D. All quotations issued by Pix4D are revocable and subject to change without notice and without indicating reasons.

2.2 Confirmed Rentals. Offers are not binding until accepted by Pix4D in writing on the rental form (the "Confirmed Order", respectively, the "Rental Form"). Pix4D shall be entitled to refuse a non-confirmed order without indicating the reasons. Verbal or written agreements and changes to orders that have been placed likewise always require written confirmation by Pix4D in order to become valid.

2.3 No cancellation. Confirmed Orders are non-cancellable and payments made are non-refundable. Pix4D may, in exceptional circumstances, agree in writing to the cancellation or alteration of a Confirmed Order provided that all costs be exclusively borne by Customer.

2.4 Ownership. Pix4D shall retain full ownership of the System even if installed in or attached to real property. Customer shall have no right or property interest therein, except for the right to use the System as provided under these Conditions.

## 3. Rental Fees and Payment

3.1 Rental Fees. Customer shall pay the monthly fees in accordance with the terms specified in the Order Form. Prices do not include value added tax or any other applicable taxes or costs, which shall be

for Customer's account and shall be added to each invoice.

3.2 Rental Period. The rental period shall start on the day the System is delivered as per section 5.1 and end on the day where it is returned as per section 7.1 (the "Rental Period"), it is specified that if the System is not shipped for return within 3 days of the last day of rental, the Rental Period shall be automatically extended and rental fees shall be due accordingly. A full month of rental fees shall be charged for any additional started month.

3.3 Payment. Rental payments foreseen by the Order Form must be made in advance, through [www.pix4d.com](http://www.pix4d.com) or by wire transfer to the bank account indicated by Pix4D. All other payments owed under the Conditions are due within 15 days as from the date of the invoice.

3.4 Full payment. All payments shall be made without any deduction. The place of payment for all payments to be made by Customer is the registered office of Pix4D.

3.5 Late Payment. With regard to payment, Customer acknowledges and agrees that time is of the essence. Pix4D may, without prejudice to any other rights of Pix4D and without a written reminder, charge interest on any overdue payment at 5% (five percent) per annum from the due date computed on a daily basis until all outstanding amounts due by Customer are paid in full. All costs and expenses incurred by Pix4D with respect to the collection of overdue payments (including, without limitation, reasonable attorney's fees, expert fees, court costs and other expenses of litigation) shall be for Customer's account.

## 4. Delivery

4.1 Delivery. Pix4D shall organize the shipment at its costs and bear the risks until the System is at the disposal of the Customer at the place indicated on the Confirmed Order. In the case of international delivery, Pix4D shall further clear the System for export, it is specified that Customer shall be the importer of record and, as such, shall obtain at its own risk and expense any import authorization, carry out all customs formalities and pay any costs (incl. import duties, taxes or customs clearance costs) in relation to the import of the System.

4.2 Inspection. Customer must inspect the System immediately upon receipt and satisfy himself/itself that the delivered goods are undamaged and in conformity with the Rental Form. Any apparent damage must be immediately notified to the carrier, prior to accepting delivery. In any event, all complaints regarding the System must be made in writing and reach Pix4D within 5 days of delivery. Provided damage during transport is confirmed by the carrier, Pix4D shall deliver a new System as per the Confirmed Order. Failure to complain within the appropriate time or any use of the System shall be



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deemed to be an unconditional acceptance of the delivered goods and waiver of all claims in respect thereof.

4.3 Delay. Unless stated otherwise in the Confirmed Order, any times or dates for delivery by Pix4D are estimates and shall not be of the essence. Pix4D is entitled to deliver the System as stated in the Confirmed Order in parts and to invoice separately. Delay in the delivery of the System shall not relieve Customer of his/its obligation to accept delivery thereof unless Customer cannot reasonably be expected to accept such late delivery.

## 5. Duties of the Customer During the Rental Period

During the entire Rental Period (which covers – for the avoidance of doubt – the whole duration where the System is in possession of the Customer), the Customer shall be bound by the following undertakings.

### 5.1 Use

(a) The Customer agrees to properly follow the operating and service instructions and to have the System operated only by personnel with the required knowledge and skill.

(b) The System must be looked after and handled carefully, in particular during installation and removal.

(c) The Customer shall provide and equip the System with appropriate power and internet connection (via SIM card or Wi-Fi), for which Pix4D assumes no liability. The Customer undertakes to protect the System from electrical overload and shall be fully responsible for any damage in relation thereto (see section 7.2).

(d) The Customer acknowledges that the use of the System may be subject to requirements or limitations under any law, statute ordinance, regulation, code or standard ("Laws and Standards"). Customer shall be exclusively responsible for ensuring compliance with all Laws and Standards associated with his/its intended use of the System and for obtaining all necessary approvals, permits or clearances for such use.

### 5.2 Damage and Repair

(a) Any damage to or malfunction of the System during the Rental Period must be immediately notified to Pix4D.

(b) Any repair on the System shall be exclusively performed by Pix4D personnel. Customer shall not disassemble or open the System, attempt any repairs or make any modifications thereto unless instructed by Pix4D personnel in writing.

### 5.3 Ownership Protection.

(a) The Customer shall only be allowed to attach the System to other equipment temporarily, as required by the normal use of the System.

(b) The Customer shall keep the System separate from its own equipment and shall mark it to indicate that it is Pix4D's property.

(c) The Customer shall ensure that any ownership labels remain safely attached to the System under all circumstances and refrain from removing them.

(d) In the event the System is levied upon or is threatened with seizure or the like, in particular during debt-recovery, insolvency or receivership proceedings, Customer shall immediately notify Pix4D and take all actions and file all petitions required to inform third parties and defend Pix4D's ownership interest in the System. Customer shall indemnify Pix4D against all loss and damages by such action.

## 6. Return of the System and Liability for Damages

6.1 Return. Unless otherwise indicated by Pix4D, the Customer shall organize the return shipment at its costs and bear the risks until the System is at the disposal of Pix4D at the place indicated on the Confirmed Order. In the case of international return shipment, Customer shall further clear the System for export, it being specified that Pix4D shall be the importer of record and, as such, shall obtain at its own risk and expense any import authorization, carry out all customs formalities and pay any costs (incl. import duties, taxes or customs clearance costs) in relation to the import of the System back in Switzerland. The Customer shall provide for appropriate insurance for the System during the return shipment. Section 4.2 shall apply in case of delay and the Rental Period be extended accordingly.

6.2 Liability for Damages. The System must be returned in good working condition at the end of the Rental Period. The hand-over to the carrier for return to Pix4D shall constitute confirmation thereof. Any cost of damages to, loss or destruction of the System during the Rental Period outside of normal wear and tear shall be reimbursed by the Customer, including damage caused by improper use, treatment or storage.

## 7. Limited Warranties and Liability of Pix4D

7.1 **Limited Warranty.** Pix4D solely guarantees that the system shall be free from defects in material and workmanship upon delivery. Pix4D gives no further guarantees, express or implied, including, without limitation, the condition, merchantability, design, capacity, performance, fitness for any specific purpose and absence of downtime of the system or of the data produced by it. The warranty shall not apply to any system, or portion thereof, which has been subject to abuse, misuse, improper installation, maintenance or operation, electrical failure or abnormal conditions, or unauthorized tampering, modification or repair.

7.2 **Exclusive remedy.** Customer's sole remedy under the warranty (see section 8.1) shall be limited to, at Pix4D's discretion, the replacement or repair of





the defective system, to the exclusion of all other remedies.

**7.3 Limited liability.** Pix4D shall assume no liability of any kind (incl. direct, indirect or consequential damages) in connexion with the system or the rental thereof to the fullest extent permitted by law, it is specified that the exclusion of liability does not apply in case of willful misconduct or – except with respect to auxiliaries – in case of gross negligence by Pix4D. In particular, Pix4D shall not be liable for any damage or harm (including bodily injury or death) in relation to improper installation, use, maintenance or operation of the system, electrical failure or overload of the system, or any failure to comply with operating and service instructions.

**7.4 Indemnity.** The customer shall indemnify and hold Pix4D harmless from and against all claims, proceedings, costs, expense, damages and liability, including attorneys' fees, arising out of or connected with, or resulting from the installation, possession, use, operation or return of the system by the customer.

## 8. Miscellaneous

**8.1 Independent Parties.** Pix4D and the Customer are independent parties, and the relationship created hereby shall not be deemed to be that of principal and agent. The Customer shall under no circumstances be allowed to represent Pix4D or allow or encourage a third-party to believe in the existence of such powers.

**8.2 Heading.** The headings contained in the Conditions are included for mere convenience of reference and shall not affect its construction or interpretation.

**8.3 Complete Agreement.** These Conditions, the Order Confirmation, and any additional Pix4D terms embody the entire understanding between the Parties and supersede all previous agreements whether in writing or orally regarding its subject matter. In case of discrepancy between them, the order of descending precedence shall be 1) Order Confirmation, 2) additional terms, 3) Conditions.

**8.4 Waiver.** Failure by Pix4D to enforce at any time any provision of the Conditions shall not be construed as a waiver of Pix4D's right to act or to enforce any such term or condition and Pix4D's rights shall not be affected by any delay, failure or omission to enforce any such provision. No waiver by Pix4D of any breach of the Customer's obligations shall constitute a waiver of any other prior or subsequent breach.

**8.5 Severability.** If any provision of the Conditions is held to be unenforceable for any reason, it shall be adjusted rather than voided, if possible, in order to achieve the legal and economic intent of the Parties to the fullest extent possible. In any event, all other provisions of the Conditions shall remain valid and enforceable to the fullest extent possible

**8.6 Non-Assignment.** Neither Party may assign any of the rights or obligations under the Conditions or a

Confirmed Order without the prior written consent of the other Party.

## 9. Applicable Law and Jurisdiction

**9.1 Applicable Law.** The Confirmed Order and the Conditions shall be governed by and construed in accordance with the substantive laws of Switzerland, without regard to the conflict of laws provisions thereof. For the avoidance of doubt, the United Nations Convention on Contracts for the International Sale of Goods dated 11 April 1980 (CISG) shall not apply.

**9.2 Jurisdiction.** Any dispute arising out of, or in connection with, the Confirmed Order and/or the Conditions shall be exclusively submitted to the courts of Lausanne, Switzerland, without prejudice to a possible appeal to the Swiss Federal Tribunal.

For any questions regarding these terms, please contact Pix4D at:

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Date: 24.01.2019



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